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(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 695 923 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
07.02.1996 Bulletin 1996/06

(51) Int Cl.[6]: **F27D 1/14**, F27D 1/00

(21) Application number: **95830323.2**

(22) Date of filing: **26.07.1995**

(84) Designated Contracting States:
DE ES FR IT PT

(30) Priority: **05.08.1994 IT MC940067**

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(54) Tool for lining the ceramic insulation layer applied to the interior walls of ovens

(57) This invention concerns a tool for lining the layer of ceramic insulation applied to the interior walls of ovens consisting of a series of cell-like plates made of refractory material abutting securely against the ceramic layer by means of fixing mechanisms also realised in refractory material.

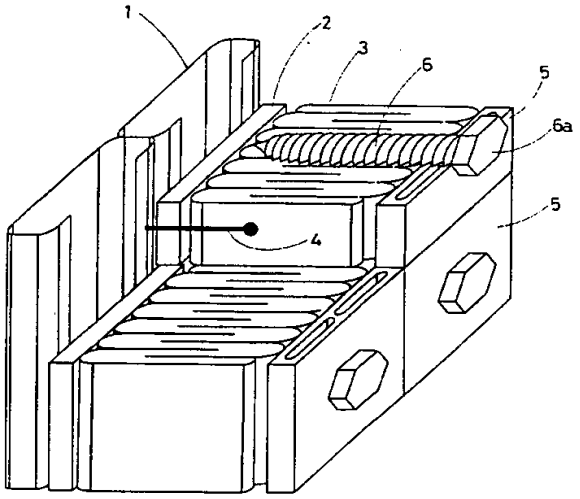

FIG. 1

18, 19, 2 & 6
3, 4

EP 0 695 923 A1

Description

This patent application involves a tool for lining the ceramic insulation layer applied to the interior walls of ovens.

Conventional ovens have a composite structure consisting, from exterior to interior, of a metal support casing, a layer of refractory material and an insulation layer that is generally in ceramic.

The use of ceramic insulation material on the interior walls of the oven is particularly critical in that the fumes strike the ceramic at very high temperatures causing the ceramic to flake, so that fine particles of material peel off the surface and are carried by the fumes outdoors where they pollute the atmosphere.

In view of these considerations and the specific anti-pollution laws introduced, the possibility of lining the interior of the insulation layer of the oven with insulating panels in refractory material has for some time been considered.

Recently ovens with a framework of refractory profile sections fixed securely to the support casing of the oven in which the refractory lining panels are fitted and fixed, have appeared on the market.

This creates a sandwich type structure against the interior walls of the oven in the sense that the layer of ceramic insulation is between two layers of refractory material: the first conventional layer being on the exterior of the oven, the second lining and protection layer on the interior.

The problem of lining the ceramic insulation layer of pre modification models, namely those that do not have the specific support framework for the refractory panels fitted during assembly, remains as yet unsolved.

The scope of this invention is to permit lining, with refractory material, the interior ceramic layer of pre modification ovens without the specific support framework in refractory material.

The tooling according to the invention consists of cell-like plates in refractory material and screws or pins also realised in refractory material for securely fixing said refractory plates against the internal face of the ceramic insulation layer on the side walls and top of the oven.

In a preferred embodiment of the invention the refractory cell-like plates are fixed on the ceramic insulation layer by means of screws, also realised in refractory material.

These screws are fitted into a specially designed hole at the centre of the respective refractory cell-like plates and then screwed to the layer of ceramic insulation.

In particular, when the self-threading screws are screwed in, the shank of the screw progressively penetrates the layer of ceramic insulation thereby remaining securely fixed in the same; the large head of these screws obviously securely holds the respective refractory cell-like plate on the ceramic layer.

The use of these self-threading screws is retained to be sufficiently secure for the application of the refractory plates on the vertical walls of the oven considering that in this situation each screw does not support the entire weight of the respective refractory plate, but simply ensures the secure vertical adhesion to the ceramic layer.

In the case of refractory plates applied to the top of the oven, the screws support its relevant weight entirely so that in this case it is preferable not to use self-threading screws but bolts in refractory material and respective nuts.

In this case, the length of the bolts must be sufficient to pass through the ceramic layer as well as the conventional refractory lining on the exterior of said ceramic layer - both pre-drilled - so that the relevant nut may be fitted on the respective shank, namely at the space between the exterior refractory layer and the support casing of the oven.

A second construction version involves cell-like refractory plates fixed against the ceramic layer by means of special refractory pins, that are fitted in pre drilled holes on the ceramic layer itself as well as on the most conventional exterior refractory layer.

Each of the pins is characterised by a wide circular head and a smooth shank terminating with a short hooking eyelet for a fork terminating at the top with a threaded shank screwed to a plate having a central threaded hole positioned - in the same way as for the nuts of the previous fixing technique described - between the support casing of the oven and the refractory layer on the exterior face of the ceramic insulation layer.

For major clarity the description of the invention continues with reference to the enclosed drawings intended for purposes of illustration and not in a limiting sense, whereby:

- figure 1 is a view of a vertical section drawing of a wall of the oven on which cell-like plates according to the invention are fitted by means of self-threading screws;
- figure 2 is a vertical section drawing of the top of an oven to which the cell-like plates according to the invention are applied by means of bolts and respective nuts;
- figure 3 shows a vertical section drawing of the top of an oven to which the cell-like plates according to the invention are fitted by means of smooth shanked pin.

With reference to figure 1, the structure of the side wall of an oven generally has a metal support casing (1) - in the case in question, consisting of series of metal vertical profile sections - on the exterior of this casing; the casing (1) having a layer of panels in refractory material (2) as well as a series of blocks (3) made of insulating ceramic material fixed to the support casing (1) by

means of suitable hooks (4).

The cell-like plates (5) made of refractory material according to the invention being fixed on the interior face of said ceramic blocks (3).

More precisely, said plates (5) have a central hole in which a self-threading screw (6) made of refractory material is fitted and having a wide polygonal head (6a) whose threaded shank is screwed and fixed into the body of the ceramic block (3) immediately behind the respective refractory cell-like plate (5).

Figure 2 refers to a section of an oven top; said top also consists of the conventional support casing, which in the case in question, consists of metal studs (7a) and panels (7b).

A layer of refractory panels (2) is also fixed on this section of casing (7) as well as a series of ceramic insulating blocks (3) fixed to the support casing (7) by means of corresponding hooks (4).

The cell-like refractory plates (5) according to the invention abut against the interior face of said ceramic blocks (3).

In this case, said plates (5) are fixed by means of refractory wide-headed bolts (8) fitted into corresponding vertical-axis holes in the ceramic blocks (3) and the refractory panels (2) furthermost from these.

The threaded end of said bolts (8) is screwed to respective nuts (9) positioned behind the above refractory panelling (2).

Figure 3 is similar to figure 2 with the difference that in this case each of the cell-like plates (5) is fixed to the interior face of the ceramic insulation block (3) behind the same by means of a smooth-shanked refractory pin (10) with wide circular head (10a) also fitted into a corresponding vertical-axis hole in the ceramic insulation layer and the furthermost refractory layer (2).

In particular, each pin (10) features an attachment eyelet (10b) at the end of its shank for a fork (10c) terminating at the top with a threaded shank (10d) that screws to a polygonal plate (11) having a central threaded hole positioned behind the above refractory panelling (2).

It should be noted that even if figure 3 refers to the use of pins (10) for fixing the cell-like plates (5) to the top of an oven, said pins (10) are used in a similar way to fix the above cell-like plates (5) on the side walls of the oven.

Claims

1) A tool for lining a ceramic insulation layer applied to the interior walls of ovens, consisting of:

- cell-like plates (5) made of refractory material having central holes;
- self-threading screws (6) made of refractory material with wide head (6a);
- bolts (8) made of refractory material with wide head;
- nuts (9) for the above bolts (8);
- pins having smooth shank made of refractory material (10) with wide head (10a), said shank terminating with an attachment eyelet (10b) for a fork (10c) terminating at the top with a threaded shank (10d);
- polygonal plates (11) having a central threaded hole that screws to the shank (10d) of said smooth-shanked pins (10).

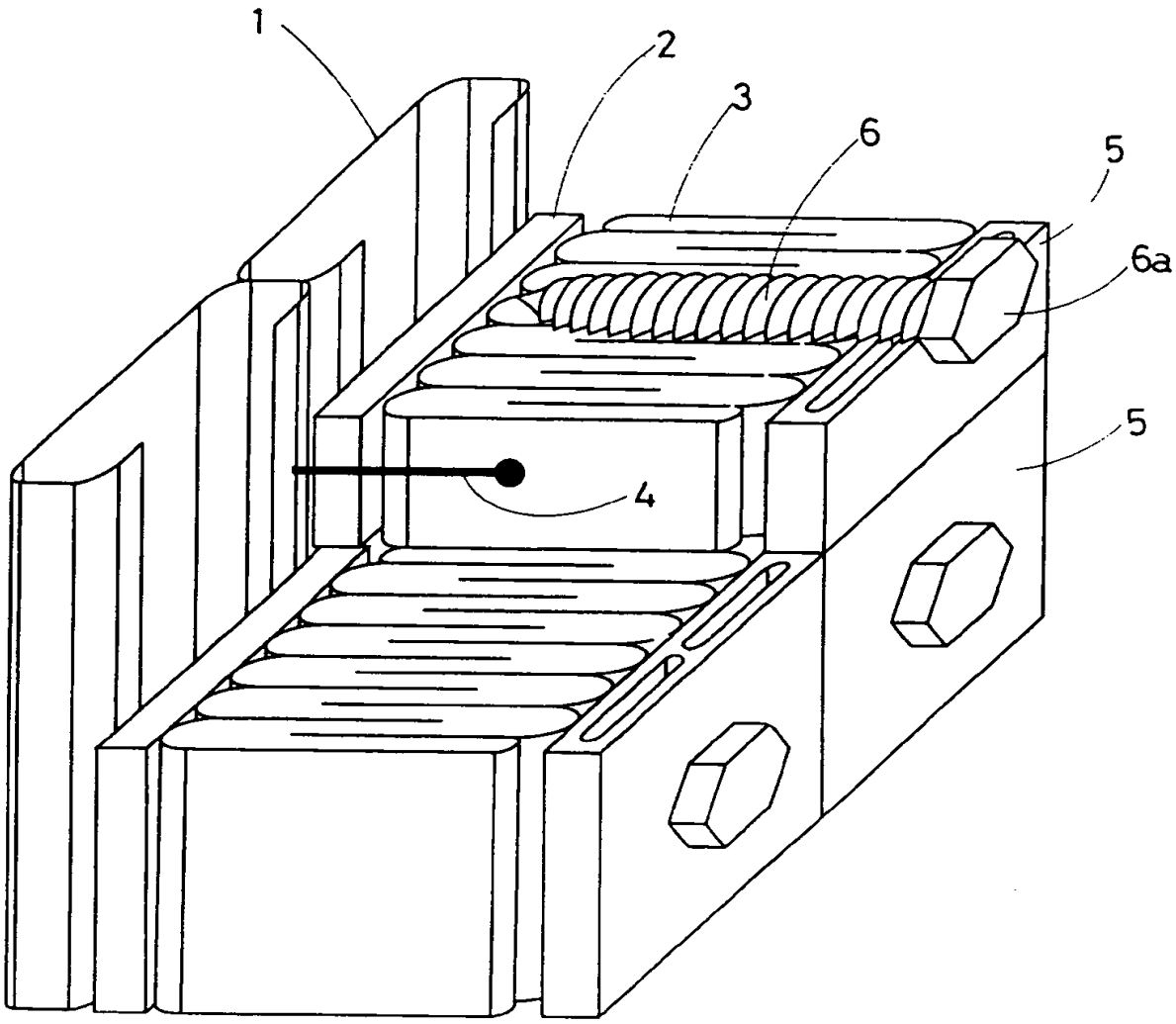

FIG. 1

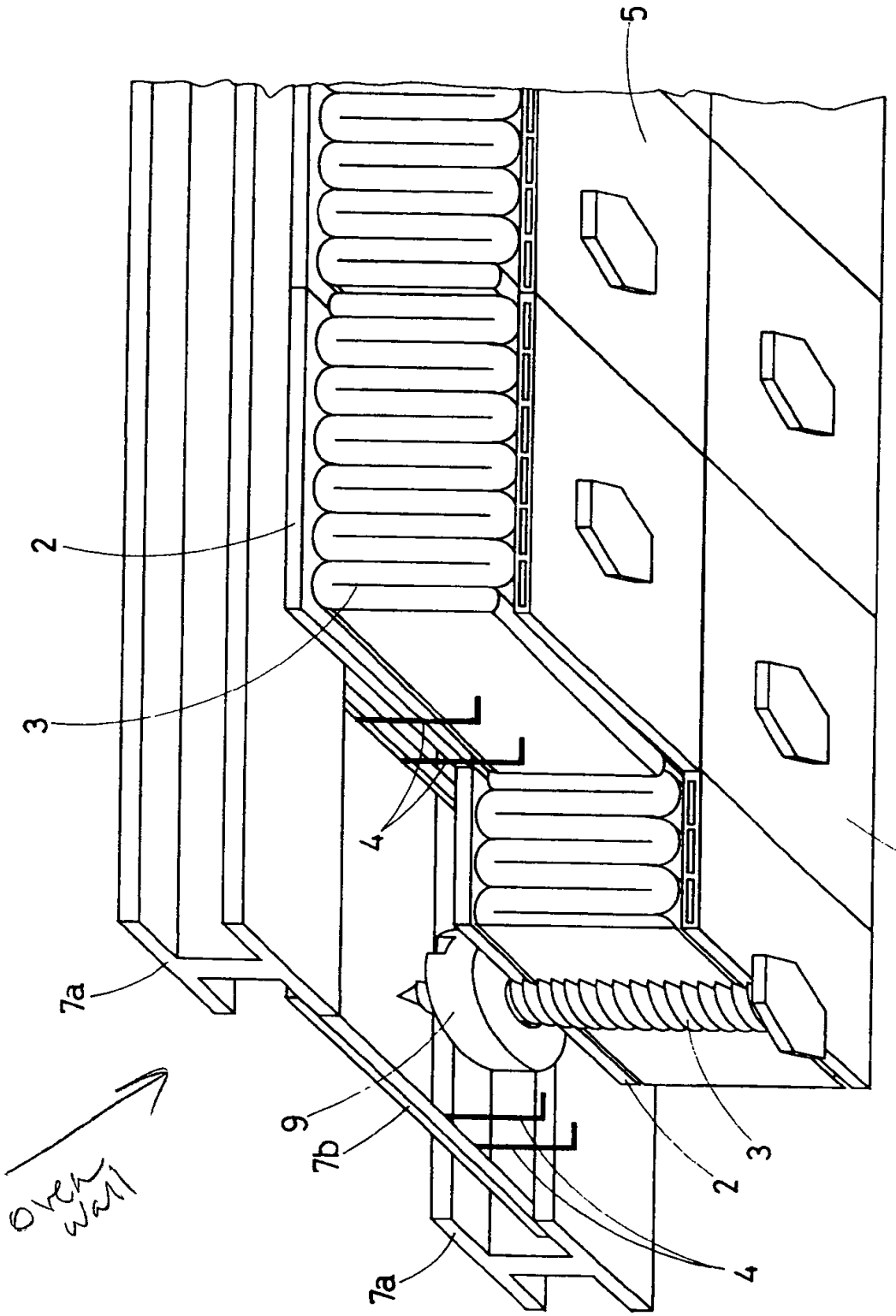

FIG. 2

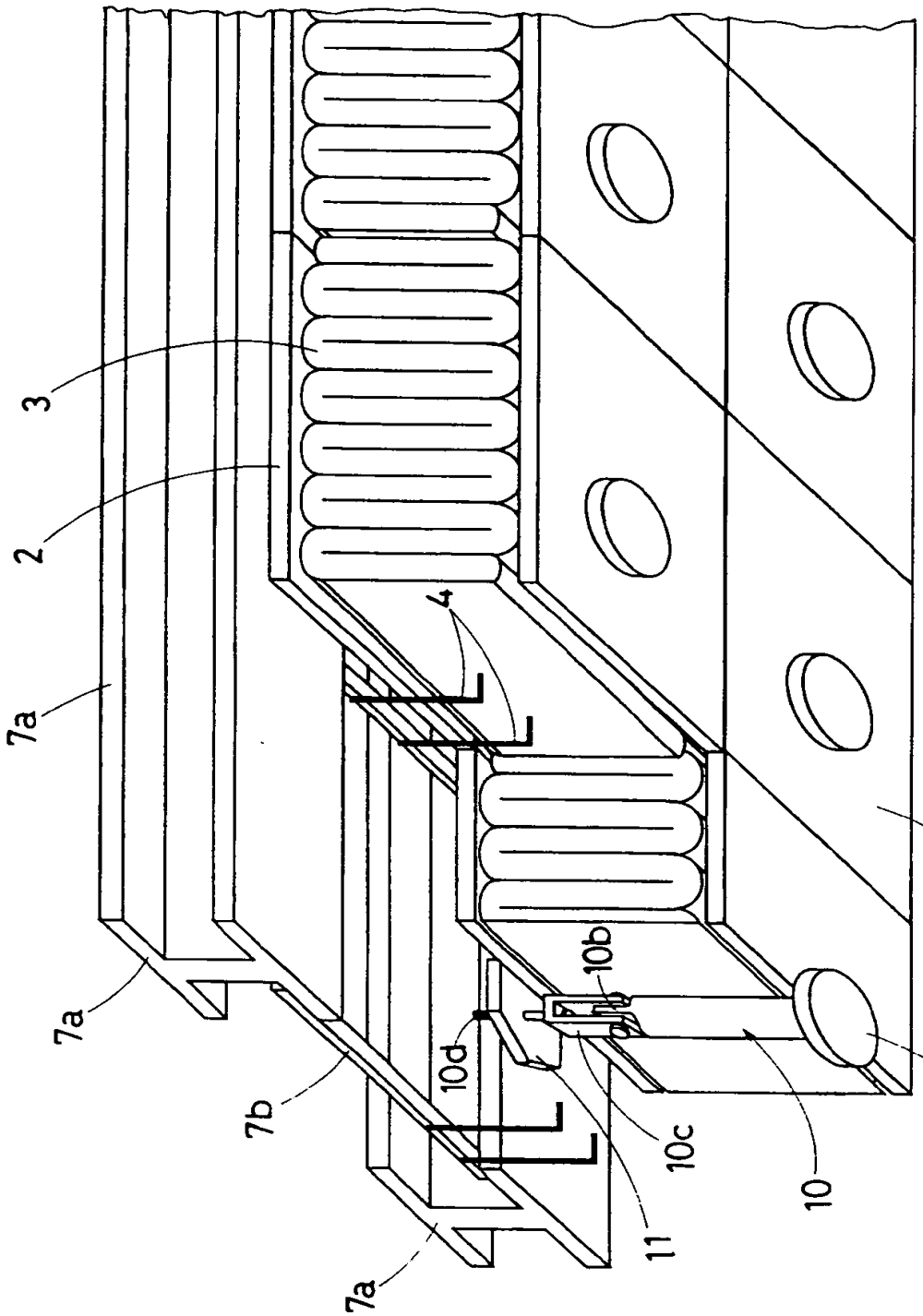

FIG. 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 83 0323

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	AU-A-535 702 (COOINDA CERAMICS) * claims; figures *	1	F27D1/14 F27D1/00
A	DE-C-36 04 493 (R.ABICHT) * claims; figures *	1	
A	FR-A-2 375 476 (THE CARBORUNDUM COMPANY) * claims; figures *	1	
A	US-A-3 523 395 (D.P.RUTTRT & AL) * claims; figures *	1	
A	GB-A-2 042 699 (NGK) * claims; figures *	1	
A	FR-A-2 216 843 (SOC GEN DES PRODUITS REFRACTAIRES)	1	
A	US-A-5 115 114 (ELTECH) * claims; figures *	1	
A	AU-A-481 101 (CARBORUNDUM PROP LD) * claims; figures *	1	TECHNICAL FIELDS SEARCHED (Int.Cl.6) F27D F27B
A	FR-A-2 279 046 (SHELLEY)		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	21 September 1995	Coulomb, J

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X : particularly relevant if taken alone
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